

Serial No10/063,754

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Amendments to the claims:

C3 1. (Currently amended) An apparatus for depositing a uniform coating on a planar surface of a movable substrate, said apparatus comprising:

a) ~~at least one~~ a linear array of a plurality of individual plasma sources that are separate from each other for generating a plurality of plasmas, wherein each of said plurality of plasma sources includes a cathode, an anode, and an inlet for a non-reactive plasma source gas disposed in a plasma chamber;

b) a deposition chamber for containing said movable substrate, wherein said deposition chamber is in fluid communication with said plasma chamber, and wherein said plasma chamber is maintained at a first predetermined pressure and said deposition chamber is maintained at a second predetermined pressure, said second predetermined pressure being less than said first predetermined pressure; and

c) a common reactant gas injector comprising a tubular-walled structure disposed in said deposition chamber between said anodes of each of said plurality of plasma sources and said movable substrate for providing a uniform flow rate of at least one reactant gas into each of said plurality of plasmas in said at least one array, said tubular-walled structure comprising two linear portions that are substantially parallel to each other and two end portions connecting said two linear portions, wherein said common reactant gas injector is circumferentially disposed with respect to said plurality of plasmas.

2. (Original) The apparatus according to Claim 1, wherein at least one of said plurality of plasma sources is an expanding thermal plasma source.

[3-4. (Canceled)]

3 5. (Original) The apparatus according to Claim 1, wherein said first predetermined pressure is at least about 0.1 atmosphere.

4 6. (Original) The apparatus according to Claim 3, wherein said first predetermined pressure is about 1 atmosphere.

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3. (Original) The apparatus according to Claim 1, wherein said second predetermined pressure is less than about 1 torr.

4. (Original) The apparatus according to Claim 1, wherein said second predetermined pressure is less than about 100 millitorr.

5. (Original) The apparatus according to Claim 1, wherein said plasma source gas comprises at least one of argon, nitrogen, hydrogen, helium, neon, krypton, and xenon.

10-17. (Canceled)

14. (Currently amended) An apparatus for depositing a uniform coating on a surface of a movable substrate, said apparatus comprising:

a) ~~at least one~~ a linear one array of a plurality of individual plasma sources that are separate from each other for generating a plurality of plasmas, wherein at least one of said plurality of plasma sources is an expanding thermal plasma source, wherein each of said plurality of plasma sources includes a cathode, an anode, and an inlet for a non-reactive plasma source gas disposed in a plasma chamber;

b) a deposition chamber for containing said movable substrate, wherein said deposition chamber is in fluid communication with said plasma chamber, wherein said plasma chamber is maintained at a first predetermined pressure and said deposition chamber is maintained at a second predetermined pressure, said second predetermined pressure being less than said first predetermined pressure; and

c) a common reactant gas injector disposed in said deposition chamber between said anodes of each of said plurality of plasma sources and said movable substrate for injecting a uniform flow of at least one reactant gas into each of said plurality of plasmas, wherein said common reactant gas injector is circumferentially disposed with respect to said plurality of plasmas, said common reactant gas injector comprising: (i) a reactant gas inlet comprising a tubular-walled structure comprising two linear portions that are substantially parallel to each other and two end portions connecting said two linear portions and having an interior space through which said reactant gas is supplied from at least one reactant gas source;

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(ii) a first plurality of orifices proximate to a first plasma, each of said first plurality of orifices extending through said tubular-walled structure from said interior space to an outer surface of said reactant gas inlet, wherein said first plurality of orifices is oriented such that said reactant gas passes from said interior space through said first plurality of orifices and is directed into said first plasma at a first flow rate; and (iii) a second plurality of orifices proximate to said second plasma, each of said second plurality of orifices extending through said tubular-walled structure from said interior space to an outer surface of said at least one reactant gas inlet, wherein said second plurality of orifices is oriented such that said reactant gas passes from said interior space through said second plurality of orifices and is directed into said second plasma at a second flow rate, said second flow rate being substantially equal to said first flow rate.

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19. (Original) The apparatus according to Claim 18, wherein said first plurality of orifices comprises a first predetermined number of orifices having a first linear density and said second plurality of orifices comprises a second predetermined number of orifices having a second linear density.

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20. (Original) The apparatus according to Claim 19, wherein said first predetermined number is equal to said second predetermined number.

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21. (Original) The apparatus according to Claim 19, wherein said first predetermined number is different from said second predetermined number.

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22. (Original) The apparatus according to Claim 19, wherein each of said first plurality of orifices has a first conductance, and each of said second plurality of orifices has a second conductance, said second conductance being equal to said first conductance.

19
23. (Original) The apparatus according to Claim 19, wherein each of said first plurality of orifices has a first conductance, and each of said second plurality of orifices has a second conductance, said second conductance being different from said first conductance.

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24-26. (Canceled)

21. (Original) The apparatus according to Claim 18, wherein said first predetermined pressure is at least about 0.1 atmosphere.

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C3 cont.
~~21~~²⁰ 28. (Original) The apparatus according to Claim ~~27~~²⁰, wherein said first predetermined pressure is about 1 atmosphere.

~~22~~¹⁴ 29. (Original) The apparatus according to Claim ~~18~~¹⁴, wherein said second predetermined pressure is less than about 1 torr.

~~23~~²² 30. (Original) The apparatus according to Claim ~~29~~²², wherein said second predetermined pressure is less than about 100 millitorr.

~~24~~¹⁴ 31. (Original) The apparatus according to Claim ~~18~~¹⁴, wherein said plasma source gas comprises at least one of argon, nitrogen, hydrogen, helium, neon, krypton, and xenon.

32-44. (Canceled)

~~8~~⁸ 45. (New) The apparatus according to Claim 1, wherein said tubular-walled structure comprises:

a) an interior space through which said reactant gas is supplied from at least one reactant gas source;

b) a first plurality of orifices proximate to a first plasma in said linear array, each of said first plurality of orifices extending through said tubular-walled structure from said interior space to an outer surface of said reactant gas inlet, wherein said first plurality of orifices is oriented such that said reactant gas passes from said interior space through said first plurality of orifices and is directed into said first plasma at a first flow rate; and

c) a second plurality of orifices proximate to said second plasma in said linear array, each of said second plurality of orifices extending through said tubular-walled structure from said interior space to an outer surface of said at least one reactant gas inlet, wherein said second plurality of orifices is oriented such that said reactant gas passes from said interior space through said second plurality of orifices and is directed into said second plasma at a second flow rate, said second flow rate being substantially equal to said first flow rate.

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cont.

9 46. (New) The apparatus according to Claim 45, wherein said first plurality of orifices comprises a first predetermined number of orifices having a first linear density and said second plurality of orifices comprises a second predetermined number of orifices having a second linear density.

10 47. (New) The apparatus according to Claim 46, wherein said first predetermined number is equal to said second predetermined number.

11 48. (New) The apparatus according to Claim 46, wherein said first predetermined number is different from said second predetermined number.

12 49. (New) The apparatus according to Claim 46, wherein each of said first plurality of orifices has a first conductance, and each of said second plurality of orifices has a second conductance, said second conductance being equal to said first conductance.

13 50. (New) The apparatus according to Claim 46, wherein each of said first plurality of orifices has a first conductance, and each of said second plurality of orifices has a second conductance, said second conductance being different from said first conductance.